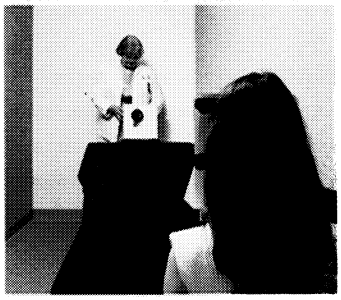
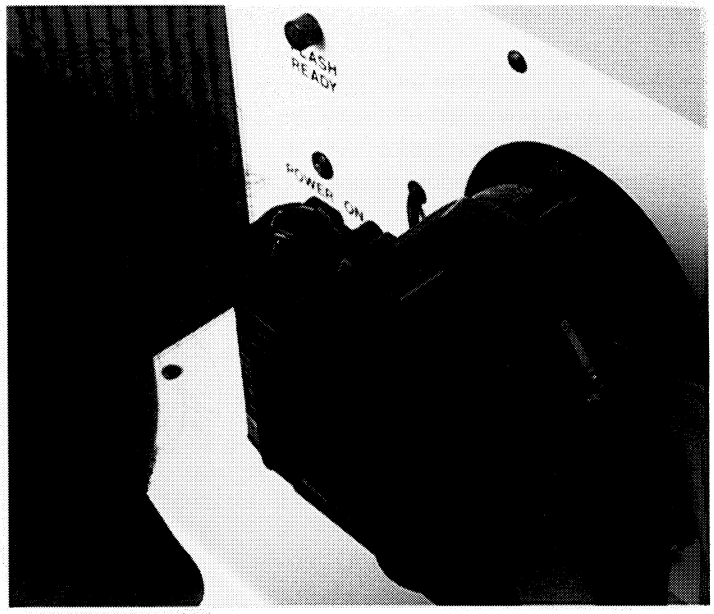
Ocular Screening System



Above, a patient is undergoing a vision screening test by means of an economical, highly reliable VISISCREEN-100 Photorefractor Ocular Screening System, a portable device designed especially to detect eye problems in children through analysis of retinal reflexes. The system, which incorporates NASA image processing technology (see page 54), is manufactured by Medical Sciences Corporation, Wedowee, Alabama. Initiated as a NASA sponsored applications engineering project, it was developed jointly by Marshall Space Flight Center and Joe Kerr, now president of MSC and chief engineer of the company's research and development department.

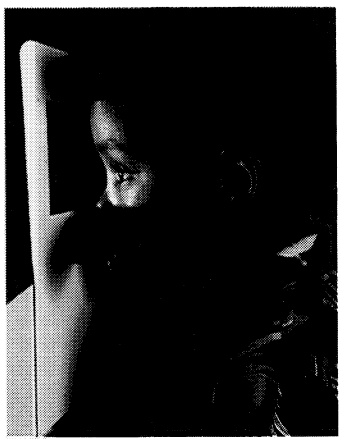
Although children should be screened regularly for amblyopia—potentially progressive dimness of vision—and other eye defects, screening programs have not been widely instituted in the United States for want of a simple, reliable, fast and relatively inexpensive method. VISISCREEN-100 fills that need. It is additionally important in that it can be used to test infants and preschool children, who otherwise might not be tested until school age. This capability allows much earlier diagnosis of "lazy eye," potentially a cause of later blindness. Dr. Keith Morgan, pediatric ophthalmologist at Louisiana State University and medical director of MSC, states that 20 percent of blindness that develops after birth is caused by too late detection of lazy eye combined with loss of vision in the healthy eye, most often from injury or diabetes.

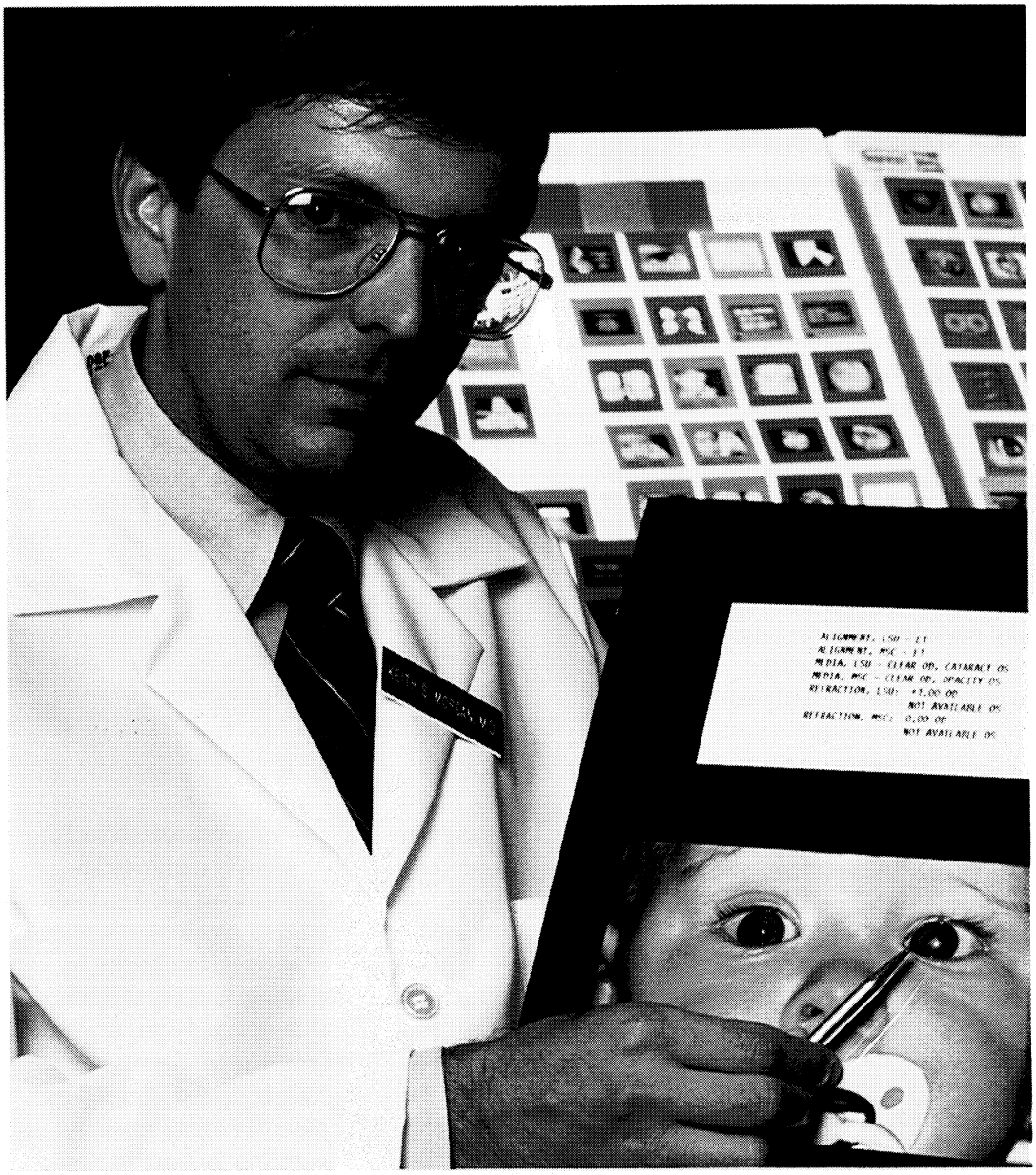
VISISCREEN-100 was evaluated in field tests on thousands of subjects before becoming fully registered with the U.S. Food and Drug Administration. During the past two years, more than 10,000 additional persons have been screened and the system's use is expanding rapidly. Last year, MSC entered into an agreement with KinderCare Corporation for vision screening at 1,025 KinderCare Learning Centers in the U.S. and Canada. MSC has also established programs in conjunction with the Illinois Department of Health and the CIGNA Healthplan of Georgia. The company has opened district offices in Illinois, Georgia and Tennessee and has plans for regional offices across the U.S. by 1991. In addition, MSC has an ongoing research program—in which Dr. Morgan and Joe Kerr are co-investigators—with the Eye Research Center of Louisiana State University.

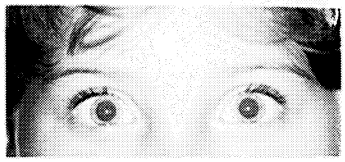


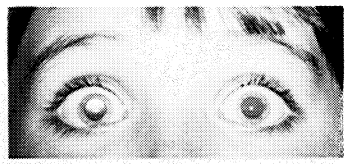
VISISCREEN's photorefractor is basically a 35 millimeter camera with a telephoto lens and an electronic flash (for camera buffs, it's a 500 millimeter f.8 telemacro catadioptric lens). By making a color photograph, the system can test the human eye for refractive error and obstruction in the cornea or lens. Ocular alignment problems are detected by imaging both eyes simultaneously.

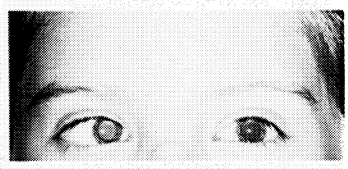
At top is the business end of the VISISCREEN-100 system, the camera and controls. At right is a young subject at the head positioning hood eight feet from the camera. The electronic flash sends light into the youngster's eyes and the light is reflected from her retina back to the camera lens. The photorefractor analyzes the retinal reflexes generated by the subject's response to the flash and produces an image of the subject's eyes in which the pupils are variously colored; the nature of a defect, where such exists, is identifiable by a trained observer's visual examination of the pupils in the image. Such analyses are performed by MSC staff members at the company's Wedowee headquarters. When defects are noted,

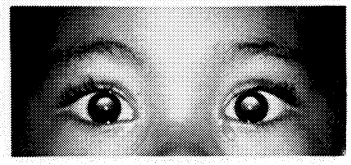












they are verified by ophthalmological follow-up. Above, Dr. Morgan displays an example of a defect detected by VISISCREEN-100. Note the difference in the child's pupils, as captured by the image. The right eye shows a red disc characteristic of a normal retinal reflex; the dark coloration of the left eye's retinal bed indicated a defect, which analysis showed to be cataract.

At upper right is a VISISCREEN photo of a child's eyes found to be normal (two red discs). In the next lower photo, the child is farsighted; the indicator is the yellow crescent at the top of the right eye. Strabismus of the right eye—squint or cross-eye—is shown in the next lower photo. The child in the bottom right photo has a moderate degree of farsightedness in both eyes, or hyperopia, as indicated by the yellow crescents at the tops of both eyes. Independent tests by Smith-Kettlewell Eye Research Foundation, San Francisco, California rated the accuracy of an early prototype of the photorefractor at 88 percent and MSC has since improved the system. ▲